Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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In the Matter of	
Advanced Television Systems and Their Impact on the Existing Television Broadcast Service	MM Docket No. 87-268
	RM-5811
Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations	
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	

COMMENTS OF NORTH AMERICAN PHILIPS CORPORATION

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SUMMARY OF COMMENTS

North American Philips Corporation (NA Philips) is encouraged by the progress reflected in the Tentative Decision and Further Notice of Inquiry. The Commission should continue its efforts to ensure that advanced television systems are introduced in the manner that best serves the American public.

The tentative decisions reached by the Commission are appropriate and should be finalized. Additional issues can and should be resolved at this stage of the process. The primary objective of all Commission actions on this subject should be to meet the needs of consumers. This, in turn, requires that terrestrial broadcasters have the opportunity to keep pace with competing modes of video program delivery such as cable and direct broadcast satellite.

The record is now sufficiently clear to permit the Commission to settle a number of issues: (1) high definition television, not enhanced definition television or improved definition television, should be the goal for terrestrial broadcasting; (2) a single HDTV standard should be prescribed for terrestrial broadcasting, and this standard should be compatible with NTSC and suitable for use by alternative delivery media; (3) open architecture receivers are not an acceptable alternative to the adoption of a single standard; (4) simulcast is not a spectrum-efficient means of meeting the need for continued availability of NTSC

programming; and (5) a 9 MHz approach (a 6 MHz NTSC main channel and a 3 MHz HDTV augmentation channel) strikes the proper balance between the need for HDTV quality and the limitations of available spectrum.

Spectrum issues have properly been given high priority by the Commission. One issue that the Commission should put to rest is that additional sharing of the UHF television spectrum by non-broadcast services will not be considered until after the HDTV-related needs of all terrestrial broadcasters have been fully accommodated. Continued uncertainty on this point is counterproductive. Also, NA Philips' analysis of the four "spectrum scenarios" set forth by the Commission establishes that a simple 9 MHz (6+3) NTSC-compatible augmentation approach will best accomodate terrestrial broadcast of HDTV. A single 6 MHz channel cannot deliver HDTV while maintaining compatibility with NTSC. A 12 MHz (6+6) simulcast approach is spectrally inefficient, given the long-term need for service to NTSC receivers. A 12 MHz (6+6) augmentation approach is also spectrally inefficient and cannot accommodate all current television licensees.

A single standard for terrestrial transmission of HDTV is needed to avoid irreparable harm to terrestrial broadcasters vis-a-vis other video distribution media and to ensure that consumers have access to HDTV capabilities at the lowest possible cost. The selection of the standard is

ultimately the responsibility of the Commission, but the Advisory Committee's recommendations should be given substantial deference and industry bodies such as the Advanced Television Systems Committee and the Electronic Industries Association should be called upon to assist with development and implementation. The standard should be one which provides for compatibility with NTSC and quality parity between terrestrial broadcasting and other distribution media. The standard should not be limited in duration.

The timetable established by the Advisory Committee appears to be appropriate to permit resolution of standards issues in a manner which affords adequate time to credible system proponents but avoids delays that permit alternate media to gain an unwarranted edge. To ensure fairness in the competitive evaluation of candidate systems, test material based on the 1125/60 production standard must not be used; 35 mm film shot at 60 frames per second is the equitable and appropriate starting point for test material.

HDTV can be enormously beneficial to the American public. Industry in America can be the major participant in bringing HDTV to the American public if the Commission acts with sufficient speed and establishes the proper priorties. The Further Notice, coupled with the Advisory Committee's work to date, represents an encouraging start, but there is much left to be accomplished. NA Philips pledges its commitment to active participation in developing policy and technological solutions to serve the public.

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North American Philips Corporation (NA Philips) hereby submits its response to the Tentative Decision and Further Notice of Inquiry (Further Notice) released by the Commission on September 1, 1988.[1] NA Philips is heartened by the Further Notice, which reflects very substantial progress in the formulation of appropriate policies for the implementation of advanced television systems (ATV).[2] Much

1/ FCC 88-288 [hereinafter cited as "Further Notice"].

2/ Following the Commission's lead (see ¶ 1 n.1), we ascribe a generic meaning to the term "advanced television" (ATV) and a much more specific meaning to the term "high definition television" (HDTV). Although the two terms

(Footnote 2 continued on next page)

more remains to be accomplished, but we believe that the Commission is on the right track in this notice-and-comment rulemaking and in the related activities of the FCC Advisory Committee on Advanced Television.[3]

Several critical issues have now been tentatively resolved, and the Commission's preliminary conclusions on these matters should now be finalized. The time is also ripe for several additional determinations that both refine and build on the previous decisions.[4] In the following discussion, NA Philips identifies several concrete actions which can help to maintain the current momentum of the Advisory Committee process and provide additional guidance to industry as developmental work continues.

(Footnote 2 continued from previous page)
are both used, as the context dictates, in the discussion which follows, we wish to emphasize from the outset that NA Philips favors policies which will promote the development and implementation of HDTV, not some lesser form of advanced television.

3/ NA Philips remains committed to full participation in the work of the Advisory Committee and its Subcommittees, Working Parties, and Advisory Groups. We supported the Advisory Committee's Interim Report, though as we have advised the Committee and the Commission the report did not fully reflect our views concerning such matters as open architecture receivers, simulcast, etc. See Letter from Thomas M. Hafner, NA Philips Senior Counsel, to Richard E. Wiley, Advisory Committee Chairman (June 30, 1988).

4/ A useful summary of some of the key issues that remain to be resolved is set forth in the Comments of the Electronic Industries Association at 1-2 (filed November 29, 1988).

I. THE COMMISSION SHOULD CONTINUE TO PRESS FORWARD WITH THE RESOLUTION OF PRIORITY ISSUES.

NA Philips applauds the Commission for the effort it has made to establish a logical process for the formulation of ATV policies. Given the complexity of the issues presented, the Commission was wise to adopt the "tentative decision" approach. The pace of ATV developments is such that the Commission must begin to make decisions on some issues, even though other issues are not yet ripe for resolution.

The Commission's actions in this proceeding must be driven, first and foremost, by the goal of benefiting consumers. Broadcasters, equipment manufacturers, and a variety of other industry interests have a substantial stake in ATV, but it is the interests of consumers which are paramount. The Further Notice evidences the Commission's commitment to this priority, and the comments which follow likewise reflect NA Philips' emphasis on meeting the needs of consumers.

A. The Tentative Conclusions Set Forth In The Further Notice Should Be Finalized.

NA Philips strongly supports the tentative conclusions expressed in the Further Notice. (¶ 4) With respect to the first tentative decision, we obviously agree that providing for terrestrial broadcast of ATV would

benefit the public. Full participation by terrestrial broadcasters in the introduction of ATV is essential to preserve the diversity and localism that broadcasting provides, and ATV capabilities will greatly enhance viewers' use and enjoyment of news, cultural, sports and entertainment programming. As the Commission is aware, our research laboratories in Briarcliff Manor, New York, and our consumer electronics division in Knoxville, Tennessee, have been making substantial monetary and personnel commitments to the development of advanced television systems, with particular emphasis on high definition television (HDTV).[5] Our work on HDTV has included very substantial efforts to provide for implementation by terrestrial broadcasters.

Concerning the second tentative finding, we share the Commission's sentiment that the benefits of ATV can most rapidly reach the public via terrestrial broadcasting. To be sure, other potential distribution media such as cable,

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5/ NA Philips has consistently taken a "home-grown" approach to NTSC television and NTSC-compatible advanced television systems. Our proposed HDTV system, HDS-NA (High Definition System for North America), was conceived, designed, and developed in the United States.

To date, NA Philips has devoted approximately $14 million for expenses and capital, and more than 70 staff years of effort, at our research laboratories in Briarcliff Manor, New York, and our consumer electronics headquarters in Knoxville, Tennessee, in the development of HDS-NA. Even greater financial and personnel commitments are planned in future efforts.

DBS, and VCRs will also exploit advanced television technology in the relatively near future, but terrestrial broadcasting offers the public a unique combination of ubiquity, ability to meet localized needs, and availability on a non-subscription basis. Accordingly, NA Philips considers it to be essential that terrestrial broadcasting remain competitive with other video distribution media, and this in turn requires that appropriate policies for the implementation of ATV by terrestrial broadcasters be developed as quickly as is prudent.

We also support the Commission's third tentative finding: the spectrum capacity for broadcast ATV should be obtained from spectrum currently allocated to terrestrial television broadcasting. This approach will expedite the introduction of terrestrial broadcast ATV, a goal which NA Philips shares. Nonetheless, at this stage, it is at least equally important for the Commission to decide that the VHF and UHF bands will be reserved for terrestrial broadcasting. NA Philips was the first HDTV system proponent to urge the Commission not to allow additional sharing of the UHF television spectrum by non-broadcast services,[6] and we remain steadfast in our position that television spectrum should be retained for television purposes.

6/ See Reply Comments of North American Philips Corporation, GEN. Docket No. 85-172 (Aug. 29, 1986).

We particularly wish to endorse tentative conclusion number 4: "existing service to viewers utilizing NTSC receivers must be continued." From the outset, while some system proponents were equivocating and others were denying the need for compatibility, NA Philips has insisted that ATV should be implemented in a manner that preserves the availability of unimpaired television signals for today's -- and tomorrow's -- NTSC receivers, without the need for additional new equipment.[7] NTSC compatibility is a bedrock principle that must not be compromised.

The Commission's fifth tentative finding flows logically from the fourth, and we endorse it as well. In light of the need for compatibility and the constraints of spectrum allocations, systems requiring more than 6 MHz to broadcast a non-NTSC-compatible ATV signal must be eliminated from consideration.

Sixth, we share the Commission's belief that the introduction of ATV via media other than terrestrial broadcasting should not be retarded, but we caution that the benefits of compatibility among various distribution media

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7/ Requiring that consumers purchase converters to permit the continued reception of television programming on NTSC receivers would not be appropriate. Converters would force consumers to incur unnecessary expense (perhaps as much as $100 per television set) and suffer needless inconvenience (wiring complications, additional potential for equipment failure, additional complications when troubleshooting, etc.).

should be kept in mind. For precisely this reason, NA Philips has developed a systems approach that meets the needs of all video distribution media, including terrestrial broadcasting, cable, and direct broadcast satellites. A multiplicity of incompatible technologies would hinder public acceptance of ATV by creating consumer confusion and increasing consumers' costs.

On each of these points, the Commission's tentative findings are commendable, especially when viewed in terms of the needs of the American public, as consumers of television programming and users of TV receivers. The Commission's decisions also bode well for broadcasters, whose very existence is at stake, and receiver manufacturers, who can maintain and increase their commitment to research, development, and manufacturing in the United States.

B. Several Other Urgent Issues Should Now Be Addressed.

The tentative findings articulated in the Notice represent genuine progress, but the Commission can and should proceed to additional decisions that provide further guidance to industry and needed assurances to consumers. To that end, NA Philips proposes that several particular issues be resolved in this phase of the proceeding. Among the issues that should be settled soon are the following:

1. The Commission should expressly commit to the objective of enabling terrestrial broadcasters to transmit high definition television. Neither "improved definition television" (IDTV) nor "enhanced definition television" (EDTV) is an adequate substitute for HDTV. To meet consumer needs -- and maintain the economic viability of terrestrial broadcasters as they face intensifying competition from other modes of video program delivery -- the standard should have the following attributes: a 16:9 aspect ratio, multi-channel sound with compact disc quality, elimination of perceptible artifacts, high definition resolution, improved color rendition, and pan-and-scan capability.

2. A single HDTV standard should be promulgated for terrestrial broadcasting and should be recommended for adoption by other modes of video program delivery. The HDTV transmission standard should be consumer-oriented, that is, it should be built upwards from the NTSC signal format currently in use in the receivers owned by more than one hundred million American consumers, not driven downwards from a "production standard" created without regard to the need for NTSC compatibility. The standard should be NTSC-compatible, meaning that service to NTSC receivers must not be degraded and that NTSC receiver owners should not be required to purchase converters to receive and display terrestrial television programming. Equally important, the

system selected should be suitable for use by all video delivery media, not just terrestrial broadcasting; this will require a common studio (production) standard based on NTSC values (e.g., 59.94 frames per second and 1050 scan lines per frame).

3. "Open architecture receivers" (OARs) are not an acceptable alternative to the adoption of a single standard. Proponents of an OAR approach contemplate that incompatible ATV systems will be used in different transmission media, or even in a single medium, and that the OAR will be capable of operating with inconsistent scanning parameters. This approach would impose substantial technical and economic penalties on consumers and on industry. Common baseband video and display parameters should be established for all media.

4. Simulcast is not a viable approach to the introduction of HDTV programming. The NTSC format will be needed until well into the 21st Century, by which time the means of delivering video programming to the home may have changed radically. For the foreseeable future, any approach which requires 12 MHz per broadcaster (6 MHz for NTSC and 6 MHz for HDTV augmentation or simulcast) would be wasteful of spectrum.

5. To the greatest extent possible, all terrestrial broadcasters should be able to participate in the

delivery of HDTV programming. In striking the proper balance between spectrum requirements and picture quality, the Commission should be mindful that, to remain competitive with other delivery media, terrestrial broadcasters must be able to offer comparable signal quality. The necessary HDTV quality cannot be achieved in a 6 MHz channel while still retaining compatibility with NTSC. The solution is to prescribe a 9 MHz (6+3) NTSC-compatible approach where the 3 MHz augmentation channel would not necessarily be contiguous with the NTSC main channel.

All of these points are discussed below, in the course of responding to the Commission's various questions concerning spectrum and standards issues (Parts III and IV of the Further Notice).[8] At this stage in the proceeding, however, it is not possible to provide definitive answers to all of the detailed questions posed in the Further Notice. As the Commission has recognized, ATV issues involve complex technical, economic, and policy considerations, many of which require the focused study now underway in the Advisory Committee. NA Philips will continue to participate actively in the work of the Advisory Committee, and we expect that

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8/ We have deferred comments on Part V of the Further Notice, as well as subpart E of Part III, believing that these sections raise issues that, in the first instance at least, can most properly be addressed by broadcasters.

the Advisory Committee's work will continue to be helpful to the Commission in its consideration of ATV issues.

II. TERRESTRIAL BROADCASTING OF HDTV CAN BEST BE ACCOMMODATED BY A 6+3 NTSC-COMPATIBLE AUGMENTATION APPROACH TO SPECTRUM ISSUES.

NA Philips believes that full participation by terrestrial broadcasters is essential to the commercial success of HDTV, and that full participation in HDTV is essential to the continued viability of terrestrial broadcasters. The Commission should declare that the spectrum currently allocated to terrestrial television broadcasting will be preserved for that purpose; the Commission should not permit the available broadcast spectrum to be used by other non-broadcast services. Further uncertainty on this issue is wasteful and counterproductive. (¶¶ 91, 96)

In its consideration of spectrum issues, the Commission should strike the proper balance between the reality of spectrum scarcity over the next decades and the need to permit all broadcasters to provide picture quality sufficient to permit effective competition with alternate video delivery media. NA Philips is of the view that the spectrum necessary to permit current terrestrial broadcasters to provide HDTV services can be found within the existing VHF/UHF broadcast allocations. (¶¶ 73-82)

A. 6+3 Augmentation Provides The Best Possible Balance Between Spectrum Constraints And The Need For HDTV Quality.

Although final spectrum decisions should await field tests of candidate ATV systems (¶ 94), NA Philips believes that the best solution involves the use of an additional (but not necessarily contiguous) 3 MHz augmentation channel by each broadcaster. Information in the augmentation channel would supplement information contained in the standard 6 MHz NTSC channel. We discuss the various spectrum scenarios identified by the Commission in the following paragraphs.

NA Philips believes that the proper balance cannot be achieved within one 6 MHz channel. (¶¶ 84-86) We recognize that there is potential for picture quality improvement within the existing NTSC signal and channel by applying advanced preprocessing techniques at the studio and complementary post-processing at the receiver. This is what is known as enhanced definition television (EDTV).

Available NTSC-compatible enhancement techniques focus on eliminating the cross-luminance and cross-chrominance effects and using progressive scan at the camera and receiver but retaining interlace transmission. Some elaborate techniques even consider the extension of the NTSC 4:3 aspect ratio to 16:9. But EDTV is far short of HDTV.

HDTV requires much improved resolution, compact disc quality digital sound, and elimination of artifacts. EDTV systems without significantly improved resolution and compact disc quality digital sound will have a definite competitive disadvantage relative to HDTV transmitted over alternate media. Moreover, once the aspect ratio is changed, an essential feature of true NTSC compatibility is "pan-and-scan," a studio process for the selection of the proper 4:3 picture information (for viewing on NTSC receivers) from a wide aspect ratio source picture. Each of these features requires the transmission of more information over the same 6 MHz channel. No one has yet shown by RF field trials that the necessary HDTV capabilities can be incorporated within 6 MHz while retaining a non-degraded NTSC-compatible signal.

Short of EDTV, there is a relatively simple approach to the television picture improvement, via signal post-processing at the receiver. This is what is contemplated by the term Improved Definition Television (IDTV). Such hardware solutions have already been integrated into the latest generation of TV receivers, including sets introduced by NA Philips this Fall. The picture quality that can be achieved using IDTV techniques is significantly improved, but in the long run IDTV can never be competitive

with HDTV. Besides having picture quality limitations, IDTV is restricted to an aspect ratio of 4:3.

NA Philips is convinced that an NTSC-compatible 6+3 MHz spectrum option provides the optimal balance between spectrum use and picture quality. (¶¶ 87-88) The goal is to enable maximum performance with the least amount of interference, while minimizing unnecessary cost and disruption to broadcasters and consumers. Our HDS-NA system is being designed in this fashion, for this approach is most likely to meet the needs of all current broadcast licensees. HDS-NA uses a 6 MHz NTSC channel for compatibility and an additional 3 MHz augmentation channel for the delivery of the extra information needed for HDTV.

Two basic augmentation techniques have been proposed by NA Philips. The first uses 3 MHz of bandwidth for analog transmission of the augmentation channel information, which consists of the side panels necessary to construct a 16:9 picture, the extra resolution for the entire widened picture, and the compact disc quality digital sound information, as well as control and data signals. The second augmentation technique, which NA Philips plans to utilize in the final version of HDS-NA for broadcast and cable distribution systems, likewise uses 3 MHz of bandwidth but involves digital modulation of the same augmentation information described above. Digital transmission of the

augmentation channel will permit a signal level lower than the standard NTSC signal level, resulting in favorable interference conditions within the same propagation constraints.

NTSC-compatible ATV systems requiring two 6 MHz channels, where the second 6 MHz is assigned for the augmentation information, are unnecessary and waste spectrum. (¶¶ 89-90) Moreover, it is not at all certain that the spectrum assigned to television broadcasting is sufficient to permit all broadcasters to participate if a 6+6 approach is adopted.

In the early phase of its HDS-NA system development, NA Philips built such a 6+6 MHz HDTV system, which was demonstrated to industry and government representatives in the Spring of 1987. At that time, NA Philips' objectives were to build an NTSC-compatible transmission system to support an HDTV service to new TV sets with relatively simple receiver hardware. The broadcast and cable industries, however, advised us that a 6+6 MHz approach would saddle them with excessive financial burdens. In direct response to that concern, NA Philips has modified its approach and developed a 6+3 MHz HDTV transmission system which is compatible with NTSC and adaptable to both the broadcast and cable (as well as satellite) environments.

ATV systems using two 6 MHz channels, where the second channel is assigned for simulcasting in ATV mode, would be an attractive approach only if the existing NTSC service is expected to become obsolete in the foreseeable future. (¶¶ 88-89) NA Philips believes that history and patterns of consumer behavior show that situation to be unlikely. After all, many of the receivers being bought today will be delivering satisfactory performance 15-20 years from now,[9] and the growing number of consumers of small screen television sets (e.g., 13" televisions for the kitchen, 3-5" portable televisions for camping, sporting events, and the office) will have little interest in paying for HDTV improvements for those sets. In this regard, it is telling that black-and-white televisions are still being sold in large volumes more than 30 years after the introduction of color.[10]

9/ Three years ago, a study conducted for the Consumer Electronics Group of the Electronic Industries Association established that more than half of all color television receivers purchased 15 years earlier were still in use. Electronic Industries Association, EIA Color Television Replacement Cycle Study, at 40-41 (1985).

10/ According to the Electronic Industries Association, more than 3.5 million monochrome televisions were sold in 1987 in the United States. Electronic Industries Association, Electronic Market Data Book, 1988 Edition, at 15 (1988).

Accordingly, NA Philips strongly believes that the NTSC service will coexist with ATV for many years. At least well into the 21st Century, ATV will be most effective as a complement to existing NTSC broadcast service. Therefore, the spectrum used for the NTSC simulcast would not foreseeably be able to be reclaimed, and the 6+6 MHz simulcast system will have the same drawbacks as the 6+6 MHz augmentation system.

NA Philips regards NTSC broadcasting as a valuable service to the public, which must be preserved without degradation. It should form an essential foundation for ATV technologies and services. The Commission should adopt an HDTV broadcast standard which ensures NTSC compatibility without degradation, makes efficient use of the broadcast spectrum, and enables broadcasters to maintain quality parity and compatibility with alternate media. NA Philips' HDS-NA system meets all these requirements with the least possible use of additional spectrum and is also suitable for use by other video program delivery media.

B. HDS-NA Meets The Needs Of Relay Services.

NA Philips' HDS-NA system is also designed with regard to the needs of relay systems associated with broadcast and cable distribution media. (¶¶ 97-102) Relay systems, which are integral parts of the television

transmission infrastructure, include two components: the contribution system, for the delivery of studio quality television programs from off-premises program production and post-production sites to the main studio facility, and the feeder system for broadcast quality interconnection of the main program origination site and program redistribution points (e.g., broadcast stations, CATV headends). Currently, satellite is by far the most technically advanced and economically attractive contribution and feeder technology. The applicable satellite service is called FSS (Fixed Satellite Service). For FSS applications of the contribution and feeder type, the HDTV program source must be transmitted over transponders with a very wide bandwidth in order to retain the quality of the television signal.

The NA Philips HDS-NA satellite signal has been designed so that its base bandwidth can be extended for transmission over a wide bandwidth transponder. For broadcast quality feeder applications, the HDS-NA satellite signal can also deliver HDTV over conventional 24 or 27 MHz transponders. The satellite signal is easily transcodable to the HDS-NA broadcast and cable distribution signals so that the signal conversion at the broadcast stations and CATV headends can take place with converters of minimum complexity and without signal degradation. This capability is a critical design feature of the NA Philips system.

Our HDS-NA system has been implemented in hardware and has been tested and demonstrated in baseband. To facilitate further refinement of the HDS-NA satellite transmission system, NA Philips and Hughes Communications Inc. have entered into an agreement for a first-phase field testing of the HDS-NA satellite signal applicable to 24/27 MHz FSS and DBS transponder applications.

C. Receiver Characteristics Warrant Further Study.

As the Further Notice recognizes, complete analysis of spectrum issues requires consideration of the interference immunity characteristics of television receivers. (¶¶ 69-72) The study conducted by the Commission's Office of Engineering and Technology[11] is a useful starting point for analysis, but much additional work is needed to define accurately the interrelationships between HDTV system designs and television receiver designs.[12] As the report recognizes, using the results of a years-old study provides only the outlines for analysis, not completely accurate information from which to evaluate the

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11/ Analyses of UHF TV Receiver Interference Immunities Considering Advanced Television, FCC/OET TM 88-2.

12/ OET itself acknowledges the limitations of its study: "Some cautions in interpreting the results of this study are in order, however . . . . [W]e plan to undertake additional receiver tests and analysis programs that will improve our statistical inferences." Id. at 14.